

Interactive comment on “A porewater – based stable isotope approach for the investigation of subsurface hydrological processes” by J. Garvelmann et al.

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This innovative study uses a new method to investigate the $\delta^2\text{H}$ depth profile of porewater in the soils of a hillslope in a small Black Forest catchment in Germany. The method (developed elsewhere) was applied to various sites along two lines from the top of the slope to the stream. The results show mainly vertical movement of soil water in the upper and drier parts of the catchment, and efficient mixing of water from lateral subsurface flow paths near the stream and in wetter parts of the catchment.

The interesting data are presented in a clear and well-structured way, and the results

C4669

and conclusions are described and interpreted well with appropriate referencing. The scientific approach is valid as far as it goes, but see remarks below.

Specific Comment There is an elephant in the room here, because the study is focussed on the soil but the parts below the soil are at least as important in understanding the catchment hydrology. The study shows flow is vertically downward in the upper parts of the catchment, and some flow will undoubtedly be upwards near the stream. Hence there appears to be an important groundwater component contributing to the lower hillslope and thence to the stream, but no way of characterizing it. The authors note that it would be interesting to compare deuterium profiles with groundwater level data at the base of the hillslope in future studies. The role of occasional groundwater level rises in causing the smoothed portions of the deuterium profiles is also mentioned. Including some deeper deuterium profiles in upper parts of the catchment would also be interesting.

Technical Corrections P9092 L1 Wrong word – suggest use “concluded” or “surmised” instead of “summarized”. P9092 L18 “rapidly” not “fast”. P9097 L28 “soil depth” not “soildepth” P9098 L4 “a high” not “an high” P9098 L7 “hillslope” not “hillsope” P9098 L13 “Stewart” not “Steward” P9098 L25 et seq. Suggest “This behaviour was not observed” not “This behaviour could not be observed” P9099 L12 I think “a stable stable isotope signature” is meant not “a stable isotope signature”, but this is clumsy. Suggest “a stable deuterium signature” P9099 L14 Suggest a new paragraph starting from “Figure 8” P9100 L16 “provided a good indicator” not “provided a good influence” P9100 L17 Change “lateral subsurface” to “lateral and upward subsurface”?

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C4670